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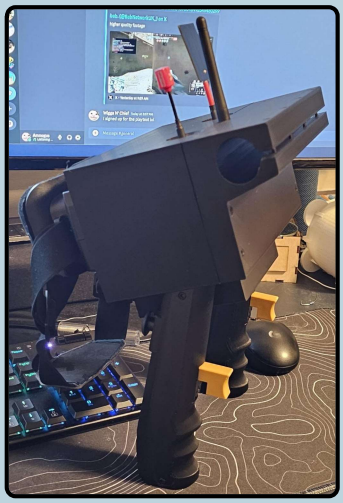
Javelin(a) - Overview

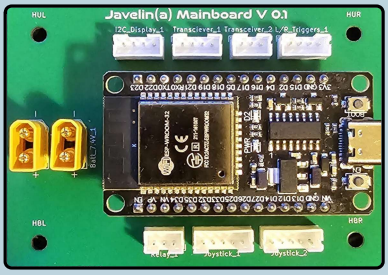
The goal for this project is to create a remote controlled airplane that can be launched out of a tube with a rocket motor that could then be flown continuously using a ducted fan. The plane is controlled from the spot where it is launched. This is an ongoing group project.

Main Housing



The main housing includes joysticks, triggers, displays, and antennas . All for control of the aircraft

PCBs



The PCBs allow for easy connection of all required components

Blast Shield

The blast shield offers protection from the initial rocket motor stage

Current Progress

- The blast shield was successfully fabricated and attached to the main housing
- Wireless communication between the main control board and the plane control board is functional
- Both PCBs and all attached components are fully functional

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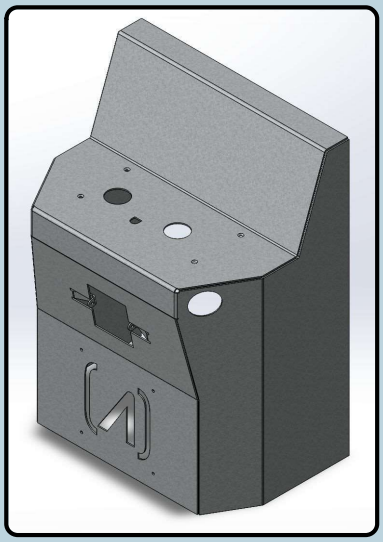
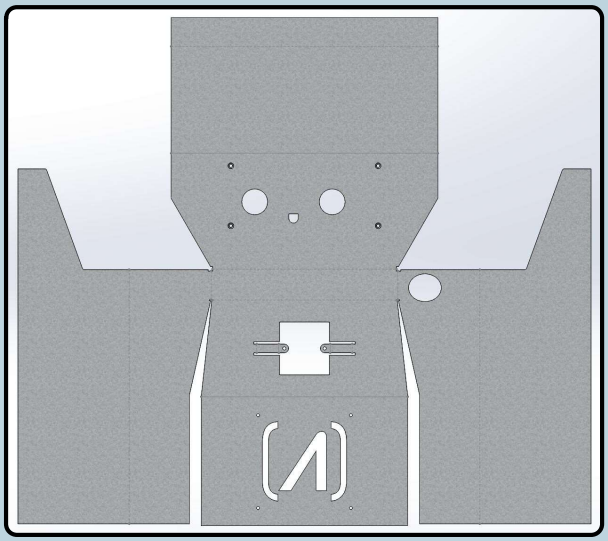
Javelin(a) - Blast Shield

This project uses a rocket motor to launch the plane out of a tube. Since the Device is launched directly next to the user, a blast shield was designed to protect the user from the rocket motor during launch.

Design



The Blast shield was designed in **SolidWorks** using the **sheet metal tools**



The flat pattern was designed such that it could be cut out by a **CNC plasma cutter** and bent on a **CNC press break**

Fabrication

The result after the flat pattern was cut and bent

The Blast shield after being welded and powder coated

The blast shield integrates well with the rest of the components and adds protection to the user

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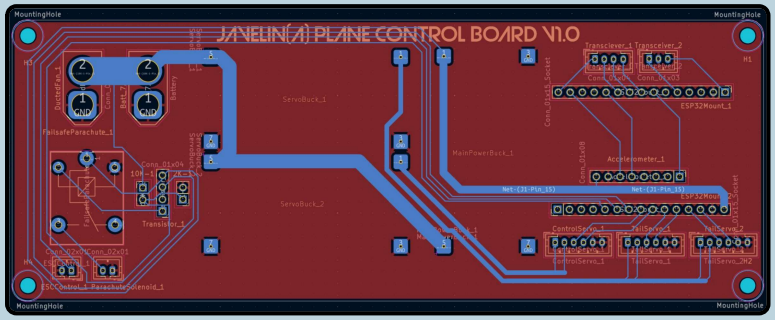
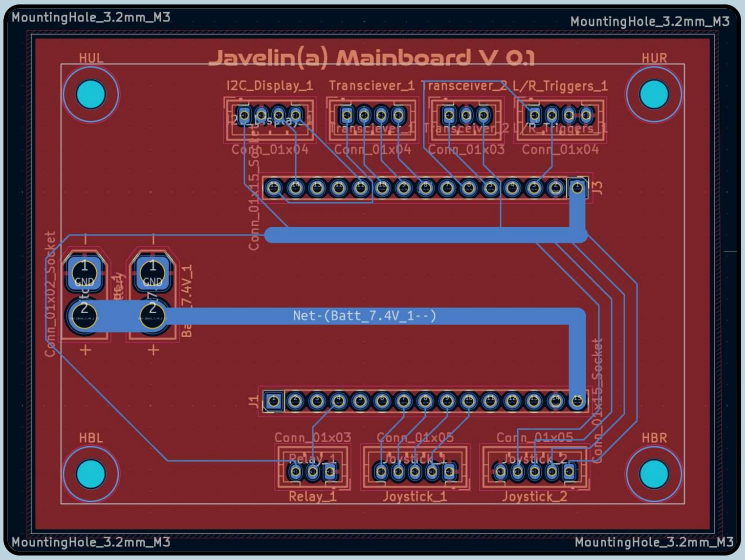
Javelin(a) - Circuitry

This project uses custom designed PCBs to connect all of the components together. This removes the need for protoboards and allows for easier manufacturing and repeatability.

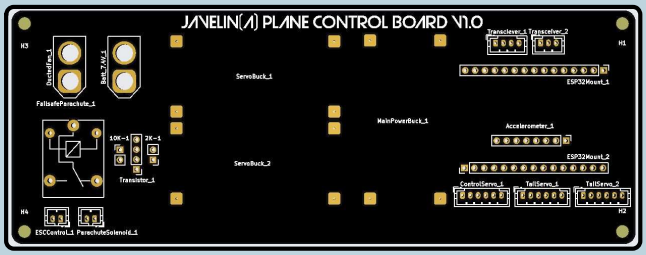
Design

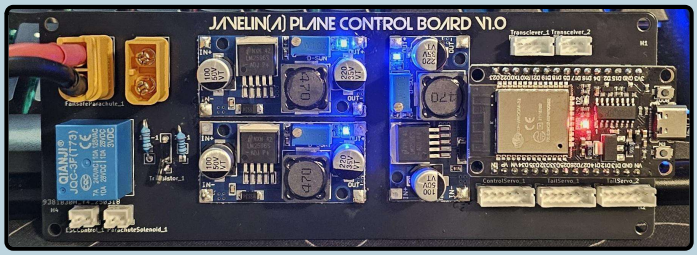


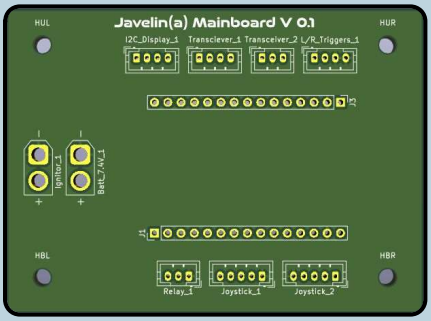


The Javelin(a) Plane Control Board and Mainboard were designed in **KiCad**

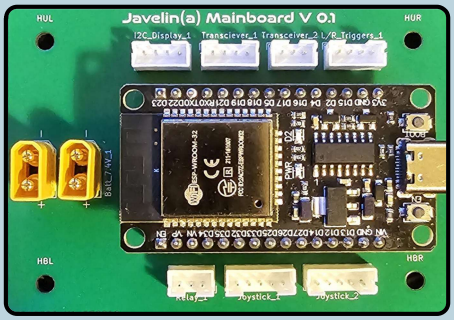
Fabrication







These are the unfinished boards from JLCPCB



The finished boards with all components **soldered** on

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Detailed Vericut Standard Operating Procedure - Caterpillar

The goal for this project was to create an in depth standard instruction guide for all of the main steps needed to create, run, and finish a Vericut project.

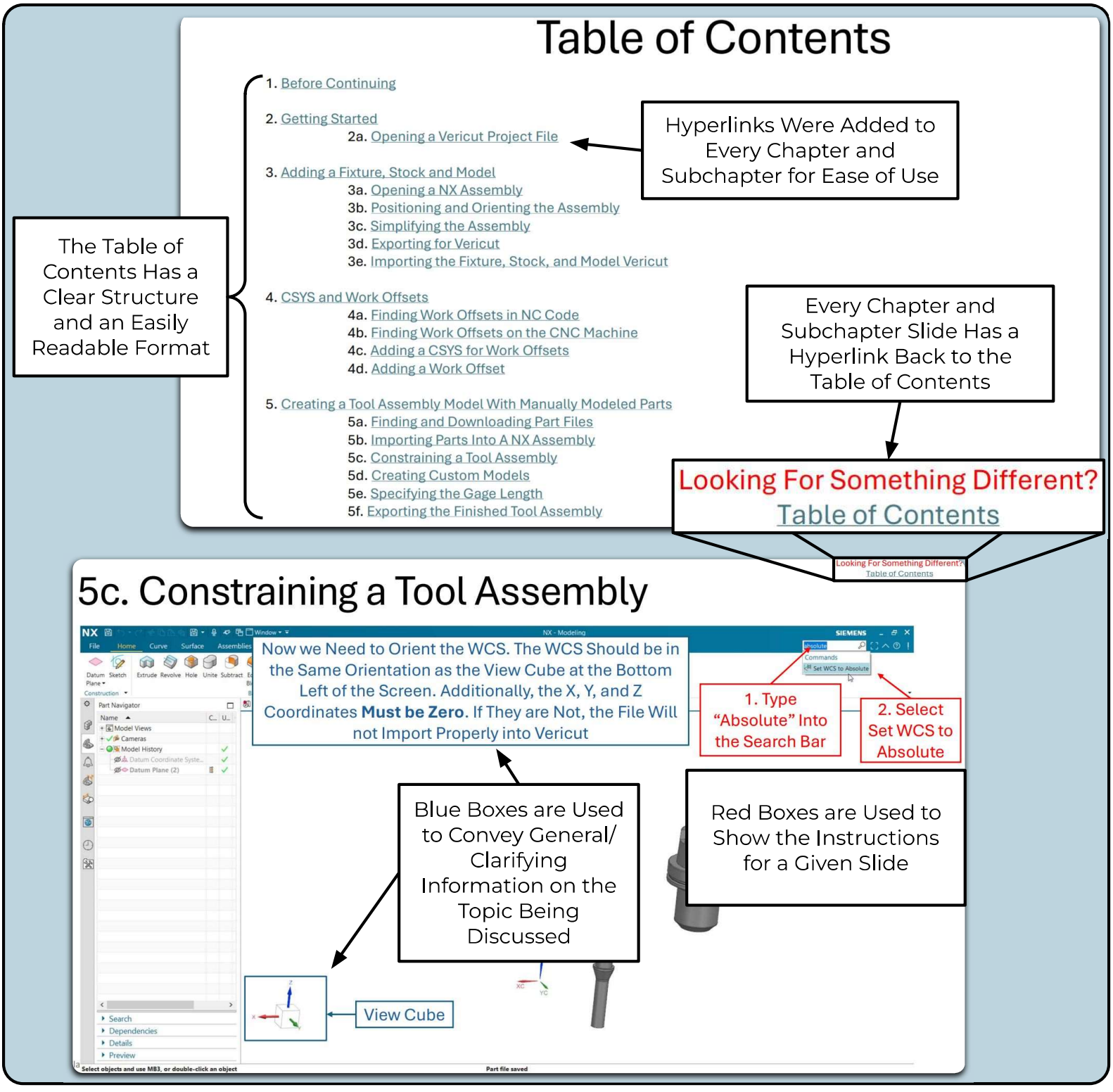
Table of Contents
1. Before Continuing
2. Getting Started
2a. Opening a Vericut Project File
3. Adding a Fixture, Stock and Model
3a. Opening a NX Assembly
3b. Positioning and Orienting the Assembly
3c. Simplifying the Assembly
3d. Exporting for Vericut
3e. Importing the Fixture, Stock, and Model Vericut
4. CSYS and Work Offsets
4a. Finding Work Offsets in NC Code
4b. Finding Work Offsets on the CNC Machine
4c. Adding a CSYS for Work Offsets
4d. Adding a Work Offset
5. Creating a Tool Assembly Model With Manually Modeled Parts
5a. Finding and Downloading Part Files
5b. Importing Parts Into A NX Assembly
5c. Constraining a Tool Assembly
5d. Creating Custom Models
5e. Specifying the Gage Length
5f. Exporting the Finished Tool Assembly
Hyperlinks Were Added to Every Chapter and Subchapter for Ease of Use
The Table of Contents Has a Clear Structure and an Easily Readable Format
Every Chapter and Subchapter Slide Has a Hyperlink Back to the Table of Contents
Looking For Something Different?
Table of Contents
5c. Constraining a Tool Assembly
Now we Need to Orient the WCS. The WCS Should be in the Same Orientation as the View Cube at the Bottom Left of the Screen. Additionally, the X, Y, and Z Coordinates Must be Zero. If They are Not, the File Will not Import Properly into Vericut
1. Type "Absolute" Into the Search Bar
2. Select Set WCS to Absolute
Blue Boxes are Used to Convey General/ Clarifying Information on the Topic Being Discussed
Red Boxes are Used to Show the Instructions for a Given Slide
View Cube

As shown in the images above, this document has been **structured to be easy to read and easily navigable**. It is also **very detailed**, with **170 slides full of step by step instructions and information**. This document was a success, and will be used to help Caterpillar employees use Vericut properly.

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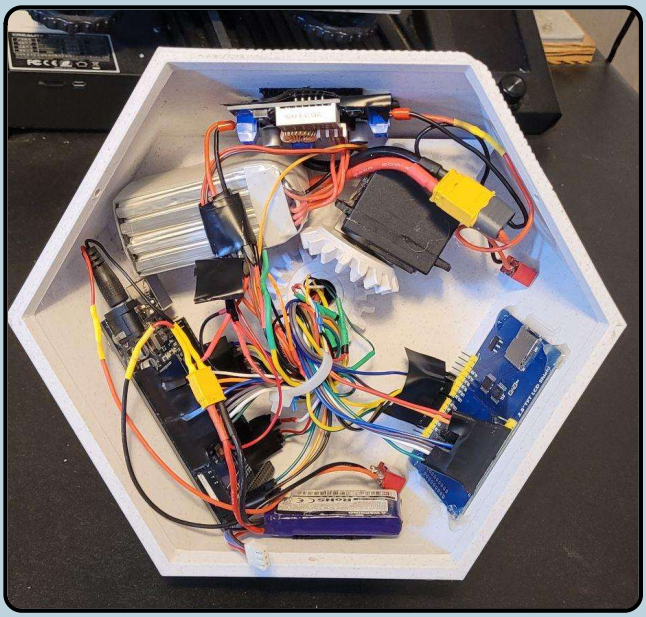
Face Tracking Goldfish Launcher

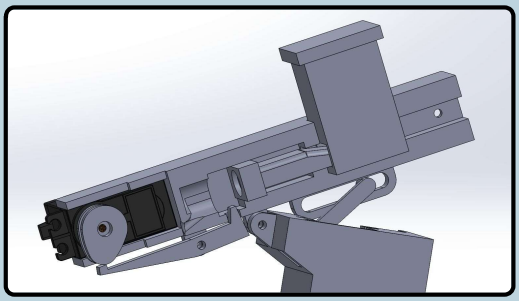
The goal for this project was to create a face tracking launcher to shoot Goldfish snacks into a user's mouth.

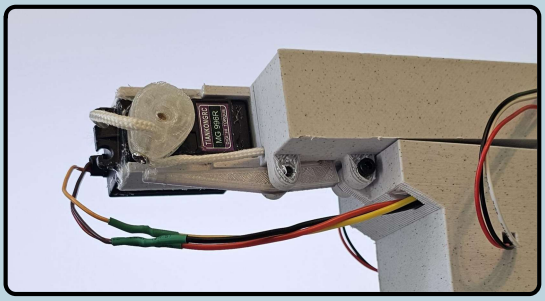
Electronics



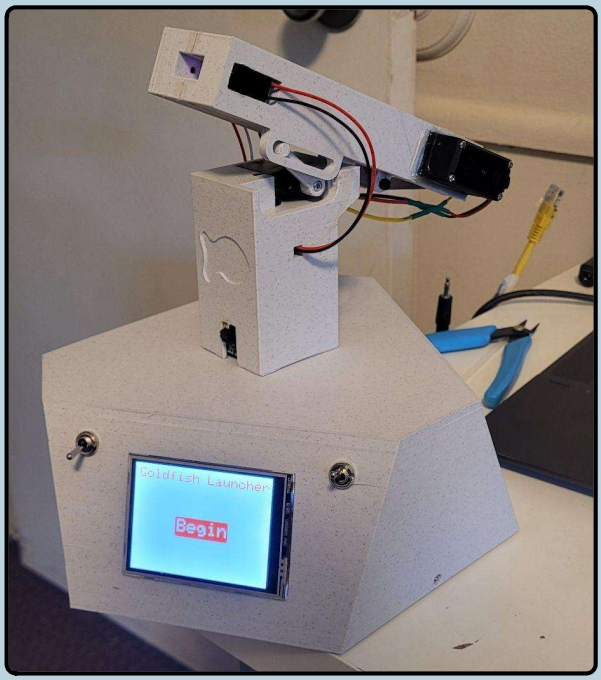
The main electronic components consist of an **Arduino Mega**, **TFT touch screen**, **servos**, **beam break sensor,** and a **Face Tracking Sensor**

Launcher





The launching mechanism uses a spring and plunger, with a servo to cock and fire the plunger

Final Product

- The goldfish launcher successfully tracked and launched goldfish at a user's face, hitting the face quite often
- However, due to inaccuracies in the face sensor module, measurements, and code, it is not able to reliably shoot Goldfish into a user's mouth.